

LAWRENCE LIVERMORE REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, Nov. 15-19, 2010

And they're off...



China may have the fastest supercomputer to date, but the Laboratory is champing at the bit.

The United States is building two 20-petaflop supercomputers, many times more powerful than anything operating today, including China's new supercomputer, the Tianhe-1A, which was officially crowned as the world's fastest system.

But Livermore is in line to take that title in 2012. A 20-petaflop system is being built for the Laboratory by IBM. That system has already been announced and is expected to arrive at the Lab in late 2011 and be in production in 2012.

The earliest it is likely to be ready for consideration in the Top500 Supercomputer Sites list will be for the June 2012 release of the ranking.

To read more, go to the [Web](#).

Running on zinc



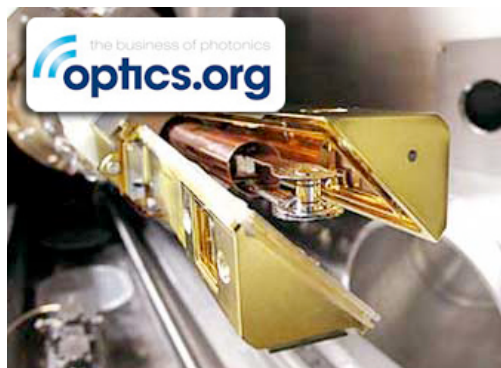
A Montana company, Zinc Air Inc., has licensed technology for a zinc-air fuel cell from the Laboratory and plans to develop a commercial product for vehicles.

The fuel cell, which uses zinc as fuel, was developed by a retired Livermore Lab chemist, John Cooper, who is on the company's board of technical advisers. The Lab and the licensor say the zinc-air fuel cell is an alternative to electric vehicle technologies based on batteries using lithium.

For the United States, there is an energy-independence theme in doing that. Lithium is rare and U.S. companies import it. Zinc is abundant in nature and the U.S. has significant reserves.

To read more, go to the [Web](#).

NIF clears latest hurdle toward laser fusion



The target is mounted in the cryogenic target positioning device. The two copper-colored arms form a shroud around the cold target to protect it until they open five seconds before a shot.

The National Ignition Facility (NIF) remains on track to achieve a fusion reaction within the next two years, following a series of key experiments performed within the past few weeks.

The NIF team set a new world record for neutron yield from a laser-driven fusion fuel capsule. In this experiment, the 192-beam system sent 121 kilojoules of ultraviolet light into a glass target containing tritium and deuterium gas in a process known as inertial confinement fusion (ICF).

Two days after that, the NIF team ramped the laser energy up by an order of magnitude to 1.3 megajoules. That represents a record for the highest energy to be delivered to an ICF target, and it was enough to produce a peak radiation temperature of approximately 6 million degrees Fahrenheit. For a comparison, the temperature at the center of our local fusion reactor -- otherwise known as the sun -- is 15 million Kelvin.

However, this experiment was designed to test the conditions produced within the target, and did not contain a "live" mixture of fuel.

To read more, go to the [Web](#).

It's not too lonely at the top



With China's Tianhe-1A, with a whopping 2.57 petaflops, at the No. 1 spot on the Top500 list of the most powerful supercomputers, it won't be long before the machine topples.

The federal government is building supercomputers that will far outstrip the Tianhe-1A by computing at about 400 times the horsepower than any current supercomputer

The Laboratory is planning to launch Sequoia, which will be almost eight times faster than Tianhe-1A at 20 petaflops, in 2012.

To read more, go to the [Web](#).

Up, up and away



ASC Purple

The Laboratory recently shut down its ASC Purple supercomputer, which five years ago was one of fastest machines in the world.

ASC Purple operated five years, from July 2005 until last week. By late last year, Purple was just the 66th fastest computer in the world.

ASC Purple was the first supercomputer capable of routinely producing the three-dimensional simulations of nuclear weapons performance that underpin stockpile stewardship. IBM built the superfast device along with Livermore Lab.

To read more, go to the [Web](#).

***Livermore Lab Report* takes a break**

LAWRENCE LIVERMORE REPORT

The *Livermore Lab Report* will take a break the week of Nov. 22. It will return to regular publication the week of Nov. 29. To see back issues, go to the [Web](#).

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research

institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the *Livermore Lab Report*, send e-mail <mailto:labreport@llnl.gov>.

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